WE CLAIM:

1. A method of creating a trench isolation structure, the method comprising

etching a trench in a substrate, wherein the trench has a base and walls;

depositing a liner on surfaces of the trench;

filling the trench with a dielectric material; and

densifying the dielectric material with a process that will cause the liner to expand.

2. The method of Claim 1, further comprising growing a layer of thermal oxide on the surface of the wafer before etching the trench.

3. The method of Claim 2, further comprising depositing a layer of silicon nitride over the thermal oxide before etching the trench.

4. The method of Claim 1, wherein etching comprises reactive ion etching (RIE).

5. The method of Claim 4, further comprising oxidizing the walls of the trench after RIE.

6. The method of Claim 1, further comprising depositing a nitride layer on the substrate before depositing the liner and after etching the trench.

7. The method of Claim 6, wherein the nitride layer is between about 10 Å and 300 Å thick.

8. The method of Claim 1, further comprising depositing an insulating oxygen barrier layer before depositing the liner after etching the trench.

9. The method of Claim 1, wherein the liner expands upon oxidation.

10. The method of Claim 1, wherein the liner comprises amorphous silicon.

11. The method of Claim 10, wherein the amorphous silicon liner is between 2 Å and 200 Å thick.

12. The method of Claim 10, wherein the amorphous silicon liner is between 50 Å and 100 Å thick.

13. The method of Claim 1, wherein filling comprises applying a liquid to the substrate.

14. The method of Claim 1, wherein filling comprises using a spin-on deposition process.

15. The method of Claim 1, wherein filling comprises using a chemical vapor deposition process.

16. The method of Claim 1, wherein densifying the dielectric material causes a linear volume decrease of the dielectric material of between about 7% and 25%.

17. The method of Claim 16, wherein densifying the dielectric material causes a linear volume decrease of the dielectric material of between about 12% and 18%.

18. The method of Claim 1, wherein densifying the dielectric material comprises oxidizing the dielectric material.

19. The method of Claim 1, wherein expanding the liner is performed by oxidizing the liner.

20. The method of Claim 19, wherein oxidizing comprises curing in a steam ambient environment in a curing chamber.

21. The method of Claim 20, wherein curing begins at an initial temperature of between about 200°C and 600°C.

22. The method of Claim 20, wherein curing completes at a target temperature between about 800 and 1200°C

23. The method of Claim 20, wherein curing comprises temperature ramping at a rate of between about 3°C and 25°C per minute.

24. The method of Claim 20, wherein curing comprises temperature ramping at a rate of between about 8°C and 20°C per minute.

25. The method of Claim 20, wherein oxidizing further comprises annealing the shallow trench for between 10 and 40 minutes at between 800°C and 1200°C.

26. The method of Claim 25, wherein annealing is done in an oxygen environment.

27. A method of densifying liquid dielectric material, the method comprising:

curing a dielectric material on a substrate in a curing chamber in a steam ambient environment, wherein the temperature in the curing chamber ramps from an initial temperature of between about 200°C and 600°C to a target temperature of between about 800°C and 1200°C at a rate of between about 3°C and 25°C per minute while the substrate is in the curing chamber; and

annealing the substrate at a temperature of between about 800°C to 1200°C for between 10 and 40 minutes after the substrate has been cured.

28. The method of Claim 27, further comprising filling a trench with a dielectric material before curing the dielectric material.

29. The method of Claim 28, wherein filling comprises spin-on deposition.

30. The method of Claim 27, wherein densifying the dielectric material causes a linear decrease of the dielectric material between about 7% and 25%.

31. The method of Claim 30, wherein densifying the dielectric material causes a linear decrease of the dielectric material between about 12% and18%.

32. The method of Claim 28, further comprising expanding a amorphous silicon liner between trench walls and the dielectric material while densifying the dielectric material.

33. The method of Claim 27, wherein annealing is performed in an oxidizing environment.

34. The method of Claim 27, wherein annealing is performed in a dry oxygen environment.

35. A method of isolating electrical components on an integrated circuit, comprising:

lining a trench with an expandable liner;

filling the trench with a dielectric filler; and

expanding the liner while contracting the filler.

36. The method of Claim 35, further comprising lining the trench with an oxygen barrier before lining the trench with the expandable liner.

37. The method of Claim 35, wherein the oxygen barrier comprises silicon nitride.

38. The method of Claim 35, wherein the expandable liner is amorphous silicon.

39. The method of Claim 35, wherein the dielectric filler is applied as a liquid.

40. The method of Claim 39, wherein filling comprises spin-on deposition.

41. The method of Claim 35, wherein expanding the liner while contracting the filler comprises oxidation.

42. The method of Claim 41, wherein oxidation comprises curing in a steam ambient environment at a temperature of between about 200°C and 600°C and ramping up to between about 800°C and 1200°C at a rate of between about 3°C and 25°C per minute.

43. The method of Claim 42, wherein oxidizing further comprises annealing at a temperature of between about 800°C and 1200°C for approximately 10 to 40 minutes.

44. The method of Claim 43, wherein annealing is performed in an oxidizing environment.

45. The method of Claim 43, wherein annealing is performed in a dry oxygen environment.

46. The method of Claim 35, wherein contracting the dielectric filler comprises a linear decrease of the dielectric filler between about 7% and 25%.

47. The method of Claim 46, wherein contracting the dielectric filler comprises a linear decrease of the dielectric filler between about 12% and 18%.

48. An isolation trench, comprising:

a nitride liner on surfaces of the trench;

a first layer of silicon oxide over the nitride liner; and

a second layer of silicon oxide over the first layer filling the trench, the second layer characterized by a faster wet etch rate than the first layer of silicon oxide.

49. The trench of Claim 48, wherein the wet etch rate is substantially consistent vertically in the first layer of silicon oxide.

50. The trench of Claim 48, wherein the wet etch rate is substantially consistent vertically in the second layer of silicon oxide.

51. The trench of Claim 48, wherein the vertical wet etch rate gradient is substantially the same for the second layer of silicon oxide in the trench as for the second layer of silicon oxide in an adjacent trench, where the trench is at least 5 times wider.

52. The trench of Claim 48, wherein the vertical wet etch rate gradient is substantially the same for silicon oxide in the trench as for silicon oxide in an adjacent trench, where the trench is at least 10 times wider.

53. The trench of Claim 48, wherein the nitride liner is between about 10 Å and 200 Å thick.

54. The trench of Claim 48, wherein the first layer is a thermal oxide.

55. The trench of Claim 48, wherein the second layer is a spin-on dielectric.

56. The trench of Claim 48, wherein the second layer is a seamless silicon oxide.